Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Wood Materials Used in Apartment Construction, 1969

Maurice G. Wright and William H. Reid
Division of Forest Economics and Marketing Research

RESEARCH PAPER WO-16

FOREST SERVICE

U.S. Department of Agriculture

May 1972

PREFACE

This report presents information on volumes of lumber, plywood, hardboard, particleboard, and insulation board used in apartment building construction in the United States during 1969. Total volumes of each wood product (excepting insulation board) are shown by geographic regions, by wood and nonwood structural classes, by use in major building components, such as roofs, floors, walls, millwork, and for facilitating purposes. Average volumes are shown per housing unit, per square foot of floor area, and per $1,000 of construction cost.

Wood-use data presented in this report were derived from wood material "take-offs" from blueprints of individual apartment buildings in a sample of 168 apartment projects for which architectural plans and specifications were completed during 1969. Estimates of wood use for facilitating purposes during construction were obtained by telephone contacts with the building contractors. Many of the methods and techniques used are based on those developed in an earlier pilot study.[1]

This study of wood materials used in apartment construction is an integral part of a more comprehensive study of wood use in the construction of selected building types in the United States. Information obtained in such studies is for use in analyses of the timber supply-demand situation in the United States and for the use of government agencies, organizations, and others interested in evaluating markets for wood products in building construction.

The authors and the Forest Service are indebted to the architects and builders who provided the basic data. Special acknowledgement is given Joseph Morsch for his assistance in developing the computer program for data analysis and computation.

[1] Reid, William H., Wright, Maurice G., and Lewis, Gordon D. Wood products used in the construction of apartment buildings in Pennsylvania. USDA Forest Service, Research Paper WO-14, 12 p. June 1971.

CONTENTS

	Page
Summary	iv
Characteristics of apartment construction	1
Wood materials used in apartment construction	2
Lumber	2
Plywood	5
Hardboard	7
Particleboard	9
Insulation board	10
Comparison of apartment surveys, 1962 and 1969	11
Definitions	12

SUMMARY

Apartment construction in the contiguous United States in 1969 is estimated to have required wood products use as follows:

Lumber	2,500 million board feet
Plywood	1,200 million square feet (3/8-inch basis)
Hardboard	31 million square feet (1/8-inch basis)
Particleboard	33 million square feet (3/4-inch basis)
Insulation board . .	29 million square feet (1/2-inch basis)

More than two-thirds of the lumber was used in floor, interior walls, and roof construction and about one-third for millwork, exterior walls and facilitating uses. Slightly more than four-fifths of the plywood went into floor, roof, and millwork items. Over half the hardboard was for millwork and most of the balance for exterior walls and floors. Almost all of the particleboard was used in millwork.

Wood materials use per apartment housing unit was: lumber 3,886 board feet; plywood 1,879 square feet; hardboard 49 square feet; particleboard 52 square feet, and insulation board 45 square feet.

The West accounted for the largest proportions of lumber and plywood, or 35 and 31 percent, respectively, of total use, followed closely by the South with 31 and 27 percent. However, the South led in use of hardboard and particleboard with 45 and 51 percent, respectively, of total use while the Northeast was next with 31 and 25 percent.

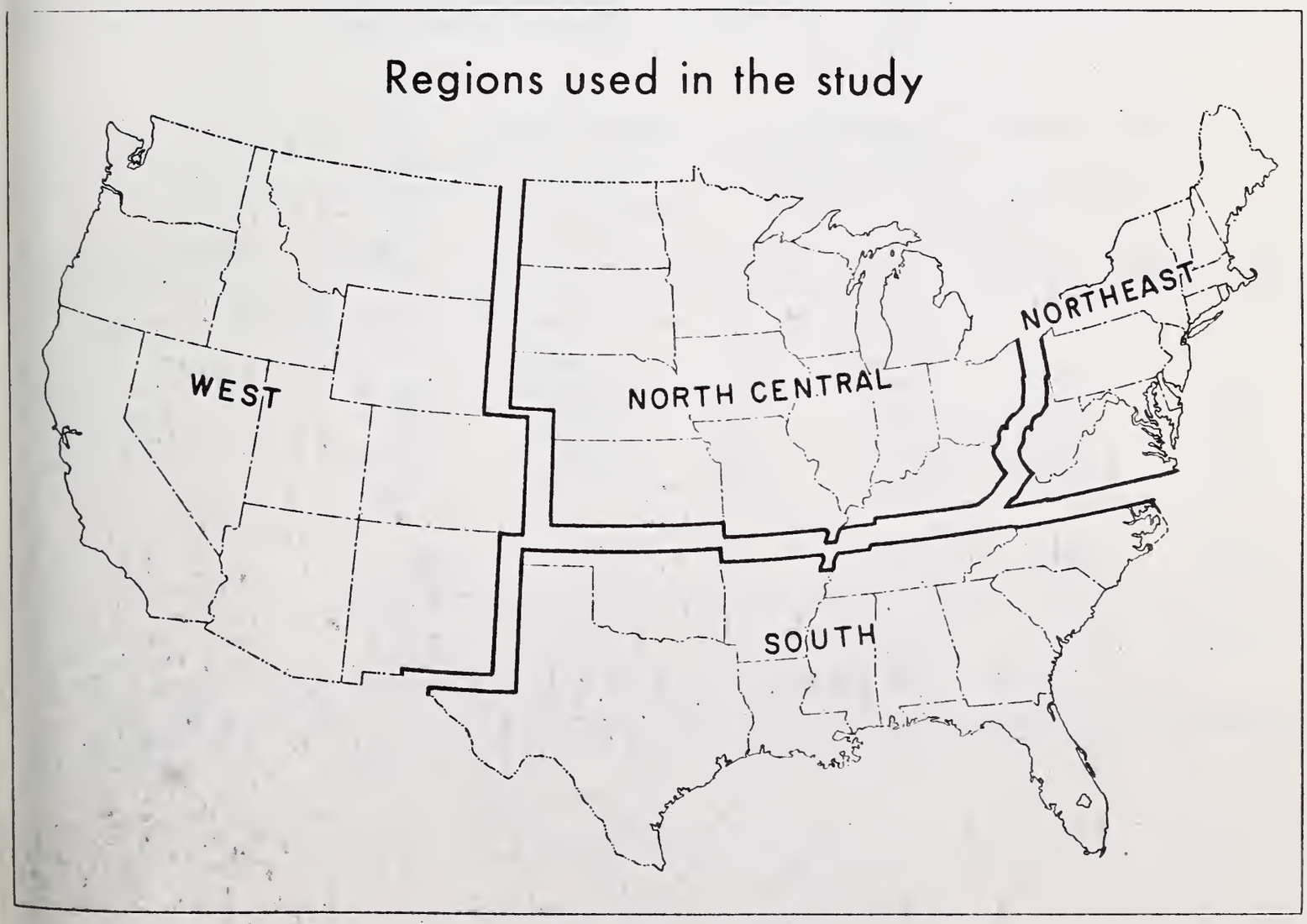

Figure 1

CHARACTERISTICS OF APARTMENT CONSTRUCTION

Prior to 1960 apartment housing units[2] represented about 20 percent of all housing starts in the United States[3]. In the ensuing 10 years, however, the proportion doubled and by 1969 such units were 41 percent of all starts.

During 1969, the number of apartment housing unit starts totaled 640,300 with 594 million square feet of floor area and a total in-place construction cost of $8.8 billion (table 1).

Regional proportions were calculated for each of these major characteristics of apartment construction using contract award data furnished by F. W. Dodge Corporation as a basis. The South (fig. 1) led with about one-third of all apartment starts, floor area, and construction cost, respectively. The balance was evenly distributed among the other three regions. Floor area per housing unit was least in the North Central and construction cost per housing unit was highest in the Northeast.

The total starts, floor area, and construction cost also were classified by wood and nonwood structural classes using a sample of 2700 "Dodge Reports" for apartment building projects. It is estimated that the wood structural class had 73 percent of all starts, 72 percent of the floor area, and 67 percent of total construction cost. The nonwood structural class had the highest average floor area and construction cost per housing unit, or 991 square feet and $17,153, respectively. Construction cost per square foot of floor area was $17.30 and $13.74, respectively, for the nonwood and wood structural class.

[2] Definitions of terms used in the study are on page 12.

[3] U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States Colonial Times to 1957.*

Table 1.—Number of housing units, floor area, and construction costs for apartment buildings constructed in the United States, by region or structural class, 1969

Region or structural class	Housing units	Floor area		Construction cost		
		Total	Per housing unit	Total	Per housing unit	Per square foot of floor area
	Number	*Thousand square feet*	*Square feet*	*Thousand dollars*	*Dollars*	*Dollars*
Region:						
Northeast	128,060	122,628	958	2,076,329	16,143	16.86
North Central	160,075	141,998	887	2,133,443	13,328	15.02
South	204,896	195,204	953	2,758,599	13,463	14.13
West	147,269	133,988	910	1,797,529	12,206	13.42
Structural class:						
Wood	471,569	426,555	905	5,862,657	12,432	13.74
Nonwood	168,731	167,263	991	2,894,243	17,153	17.30
Total or average	[1] 640,300	[2] 593,818	927	[3] 8,756,900	13,676	14.75

[1] U.S. Department of Commerce, Bureau of the Census. *Housing Starts.* Constr. Rpt. Ser. C20-70-4. 1970.
[2] McGraw-Hill Inc., Division of F. W. Dodge.
[3] U.S. Department of Commerce, Bureau of the Census. *Value of New Construction Put in Place 1958 to 1970.* Const. Rpts. Ser. C 30-705. October, 1971.

WOOD MATERIALS USED IN APARTMENT CONSTRUCTION

LUMBER

Lumber used in all building phases of apartment construction throughout the United States in 1969 amounted to 2.5 billion board feet (table 2).

The highest proportion of total use was in the West with 35 percent, or 0.9 billion board feet, followed by the South with 31 percent, North Central 20 percent, and Northeast 14 percent.

Virtually all the lumber, or 2.4 billion board feet, was used in the wood structural class. The nonwood structural class accounted for only 0.1 billion board feet, of which 62 percent was in the South.

Table 2.—Wood materials[1] used in apartment buildings constructed in the United States, by region and structural class, 1969

Region and structural class	Lumber	Plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard (3/4-inch basis)
	Thousand board feet	*Thousand square feet*	*Thousand square feet*	*Thousand square feet*
Northeast:				
Wood	326,109	194,985	7,704	5,041
Nonwood	23,070	37,694	1,832	3,122
Total	349,179	232,679	9,536	8,163
North Central:				
Wood	478,297	254,973	3,048	4,417
Nonwood	17,466	17,194	906	1,528
Total	495,763	272,167	3,954	5,945
South:				
Wood	694,479	272,518	10,917	11,842
Nonwood	72,763	57,090	3,154	5,114
Total	767,242	329,608	14,071	16,956
West:				
Wood	871,871	360,073	3,373	1,810
Nonwood	4,241	8,701	242	298
Total	876,112	368,774	3,615	2,108
United States:				
Wood	2,370,756	1,082,549	25,042	23,110
Nonwood	117,540	120,679	6,134	10,062
Total	2,488,296	1,203,228	31,176	33,172

[1] Total use of insulation board was 28.8 million square feet (1/2-inch basis); regional and structural class estimates not available due to excessive sampling error.

Two-thirds of lumber used in floor, interior walls, and roof

There were 649 million board feet used in floor construction, 552 million board feet in interior walls, and 527 million board feet in roof construction for a combined total of 1.7 million board feet or 69 percent of all lumber used in apartment construction (table 6, fig. 2). Four-fifths of this 1.7 million was framing and the balance was distributed among roof decking, subflooring, finish flooring, stairs, and various other uses.

Approximately 16 percent of all lumber was used in the exterior walls, primarily as framing lumber. 12 percent in millwork, mostly for interior doors, cabinets and moldings; and 3 percent for facilitating purposes.

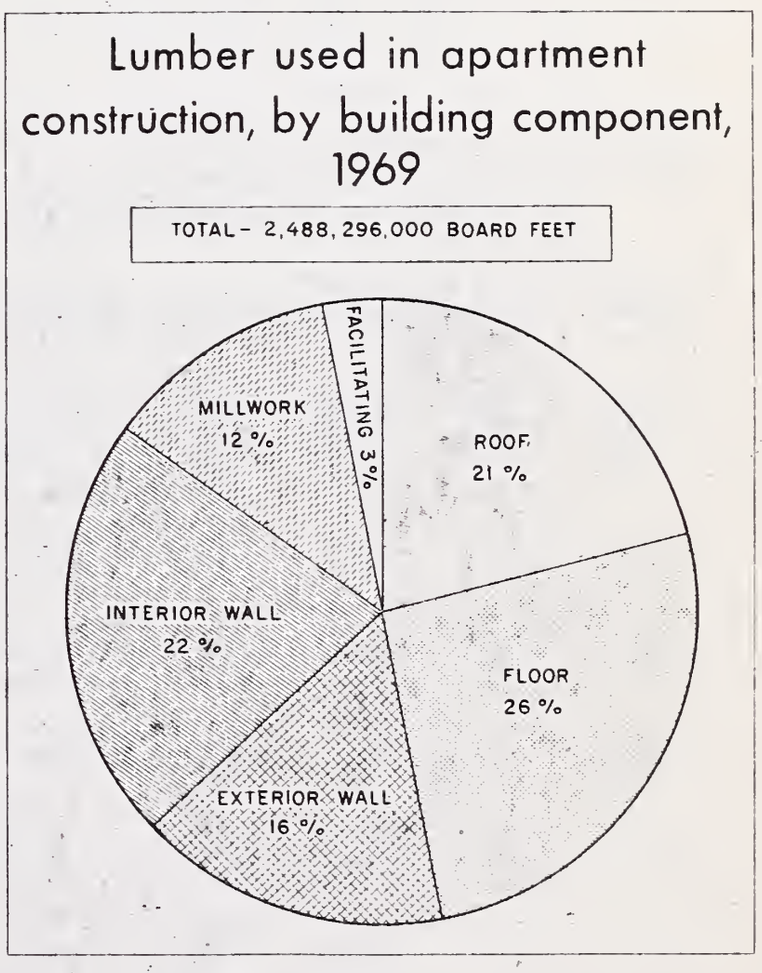

Figure 2

Building component use within the wood structural class was similar to that for total apartment construction. In the nonwood structural class, however, the use pattern was different with millwork and facilitating uses accounting for 76 percent of lumber use.

Use per housing unit averages 3,886 board feet

Average lumber use per apartment housing unit was 3,886 board feet, ranging from a low of 2,727 board feet

in the Northeast to a high of 5,949 board feet in the West (table 3, fig. 3).

The use of wood in the wood structural class showed a wide margin over that found in the nonwood structural class averaging 5,027 board feet, or about 7 times the average for wood use in the nonwood structural class.

Use per square foot of floor area, about 4 board feet

An average of 4.19 board feet of lumber was used per square foot of floor area in apartment construction (table 4). This use varied from a high of 6.54 board feet in the West to a low of 2.85 board feet in the Northeast.

Average lumber use in the wood structural class was 5.56 board feet per square foot of floor area, or almost 8 times the average of 0.70 board foot in the nonwood structural class.

Use per $1,000 of construction cost nearly 300 board feet

There were 284 board feet of lumber used for every $1,000 of apartment construction cost (table 5, fig. 4).

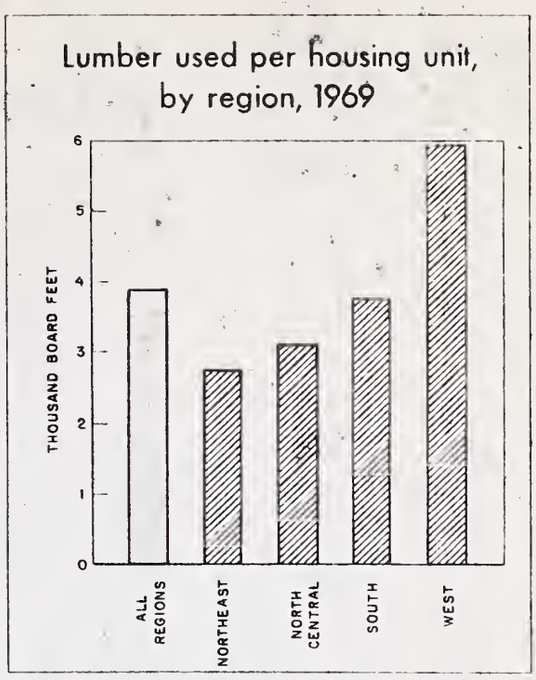

Figure 3

Table 3.—Wood materials[1] used per housing unit in apartment buildings constructed in the United States, by region and structural class, 1969

Region and structural class	Lumber	Plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard (3/4-inch basis)
	Board feet	*Square feet*	*Square feet*	*Square feet*
Northeast:				
Wood	3,780	2,314	91	60
Nonwood . .	527	861	42	71
Average, all classes . .	2,727	1,817	74	64
North Central:				
Wood	4,060	2,164	26	37
Nonwood . .	413	407	21	36
Average, all classes . .	3,097	1,700	25	37
South:				
Wood	5,114	2,007	80	87
Nonwood . .	1,053	826	46	74
Average, all classes . .	3,745	1,609	69	83
West:				
Wood	6,521	2,693	25	14
Nonwood . .	313	642	18	22
Average, all classes . .	5,949	2,504	25	14
United States:				
Wood	5,027	2,296	53	49
Nonwood . .	697	715	36	60
Average, all classes . .	3,886	1,879	49	52

[1] Average national use of insulation board was 45 square feet (1/2-inch basis).

Table 4.—Wood materials[1] used per square foot of floor area in apartment buildings constructed in the United States, by region and structural class, 1969

Region and structural class	Lumber	Plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard (3/4-inch basis)
	Board feet	*Square feet*	*Square feet*	*Square feet*
Northeast:				
Wood	4.14	2.47	0.10	0.06
Nonwood	.53	.86	.04	.07
Average, all classes	2.85	1.90	.08	.07
North Central:				
Wood	4.59	2.44	.03	.04
Nonwood	.46	.46	.02	.04
Average, all classes	3.49	1.92	.03	.04
South:				
Wood	5.71	2.24	.09	.10
Nonwood	.99	.78	.04	.07
Average, all classes	3.93	1.69	.07	.09
West:				
Wood	7.15	2.95	.03	.01
Nonwood	.35	.72	.02	.02
Average, all classes	6.54	2.75	.03	.02
United States:				
Wood	5.56	2.54	.06	.05
Nonwood	.70	.72	.04	.06
Average, all classes	4.19	2.03	.05	.06

[1] Average national use of insulation board was 0.05 square foot (1/2-inch basis).

The amount of lumber use varied among the regions from a high of 487 board feet in the West to a low of 169 board feet in the Northeast.

In the wood structural class lumber use was 404 board feet for each $1,000 of construction cost, or 10 times the average use of 40 board feet in the nonwood structural class.

Table 5.–Wood materials[1] used per $1,000 construction costs in apartment buildings constructed in the United States, by region or structural class, 1969

Region or structural class	Lumber	Plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard (3/4-inch basis)
	Board feet	*Square feet*	*Square feet*	*Square feet*
Region:				
Northeast . . .	168.90	112.55	4.61	3.94
North Central.	232.38	127.57	1.85	2.79
South	278.13	119.48	5.10	6.14
West	487.40	205.16	2.01	1.17
Structural class:				
Wood	404.38	184.65	4.27	3.94
Nonwood . . .	40.61	41.70	2.12	3.48
Average	284.15	137.40	3.56	3.79

[1] Average national use of insulation board was 3.29 square feet (1/2-inch basis).

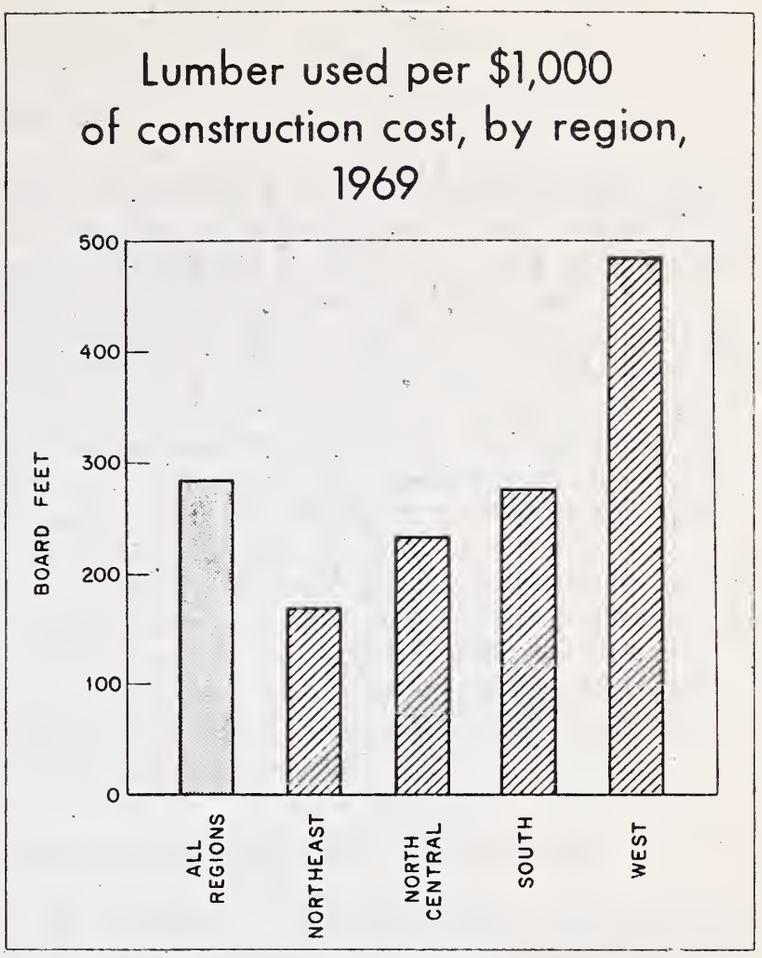

Figure 4

Table 6.–Lumber used in apartment buildings constructed in the United States, by region and structural class and building component, 1969

(Thousand board feet)

Structural class and building component	Region				
	Northeast	North Central	South	West	All regions
Wood:					
Roof	70,848	92,121	174,777	182,332	520,078
Floor.	99,116	162,309	128,608	252,167	642,200
Exterior wall	24,906	75,252	123,658	156,950	380,766
Interior wall	73,778	101,710	173,423	192,564	541,475
Millwork	45,656	42,767	84,759	78,553	251,735
Facilitating	11,805	4,138	9,254	9,305	34,502
Total	326,109	478,297	694,479	871,871	2,370,756
Nonwood:					
Roof	100	516	6,350	55	7,021
Floor	6,123	12	390	- -	6,525
Exterior wall.	175	981	2,785	36	3,977
Interior wall	1,062	2,064	7,097	199	10,422
Millwork	7,004	8,639	30,846	3,353	49,842
Facilitating	8,606	5,254	25,295	598	39,753
Total	23,070	17,466	72,763	4,241	117,540
All classes:					
Roof	70,948	92,637	181,127	182,387	527,099
Floor	105,239	162,321	128,998	252,167	648,725
Exterior wall	25,081	76,233	126,443	156,986	384,743
Interior wall	74,840	103,774	180,520	192,763	551,897
Millwork	52,660	51,406	115,605	81,906	301,577
Facilitating	20,411	9,392	34,549	9,903	74,255
Total	349,179	495,763	767,242	876,112	2,488,296

PLYWOOD

A total of 1.2 billion square feet (3/8-inch basis) of plywood was used in apartment building construction in the United States during 1969 (table 2). Regional use of plywood was largest in the West with 369 million square feet, or 31 percent of total use, and least in the Northeast with 233 million square feet or 19 percent of the total.

Plywood use in the wood structural class amounted to 1.1 billion square feet, or 90 percent of all plywood used in apartment construction. Regional distribution ranged from 33 percent in the West down to 18 percent in the Northeast.

Plywood use in the nonwood structural class varied widely by region, from a high in the South of almost half the plywood used to 7 percent in the West.

Almost two-thirds of plywood used in floor and roof construction

Of the 1.2 billion square feet of plywood used in apartment construction, 758 million square feet, or 63 percent, were used in floor and roof components—mostly for decking (table 7, fig. 5). Millwork accounted for 20 percent of all plywood used, exterior walls for 10 percent, facilitating requirements for 6 percent, and about 1 percent was used in the interior walls.

As would be expected, most of the plywood was used in the wood structural class or almost 9 times the amount used in the nonwood structural class. In the wood structural class, 36 percent of the plywood was used in the floor component, 32 percent in the roof, 17 percent in millwork, 10 percent in exterior walls and 3 percent for facilitating purposes.

There was a different mix of plywood use in the nonwood structural class. In this class 46 percent was used in millwork, 33 percent for facilitating purposes, 16 percent in floors, and 5 percent in roof and walls. A large portion of the plywood used in millwork was for shelving and kitchen cabinets.

Use per housing unit about 1,880 square feet

The average use of plywood per housing unit was 1,879 square feet (table 3, fig. 6). Use was highest in the

Table 7.—Plywood used in apartment buildings constructed in the United States, by region and structural class and building component, 1969

(Thousand square feet, 3/8-inch basis)

Structural class and building component	Region				
	Northeast	North Central	South	West	All regions
Wood:					
Roof	54,509	81,648	121,694	87,605	345,456
Floor	101,521	80,167	62,016	146,117	389,821
Exterior wall	8,921	51,062	27,673	25,089	112,745
Interior wall	456	677	1,738	11,492	14,363
Millwork	20,278	34,387	53,544	78,938	187,147
Facilitating	9,300	7,032	5,853	10,832	33,017
Total	194,985	254,973	272,518	360,073	1,082,549
Nonwood:					
Roof	215	23	3,542	--	3,780
Floor	18,989	--	5	--	18,994
Exterior wall	--	370	341	--	711
Interior wall	1,265	69	210	491	2,035
Millwork	8,635	7,578	31,453	8,210	55,876
Facilitating	8,590	9,154	21,539	--	39,283
Total	37,694	17,194	57,090	8,701	120,679
All classes:					
Roof	54,724	81,671	125,236	87,605	349,236
Floor	120,510	80,167	62,021	146,117	408,815
Exterior wall	8,921	51,432	28,014	25,089	113,456
Interior wall	1,721	746	1,948	11,983	16,398
Millwork	28,913	41,965	84,997	87,148	243,023
Facilitating	17,890	16,186	27,392	10,832	72,300
Total	232,679	272,167	329,608	368,774	1,203,228

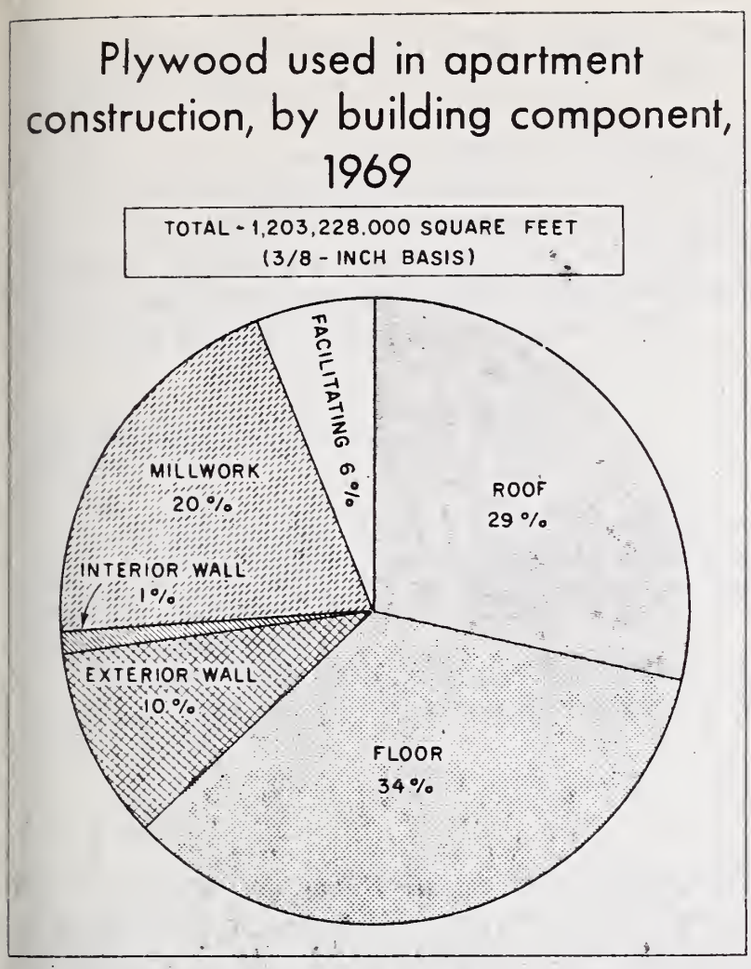

Figure 5

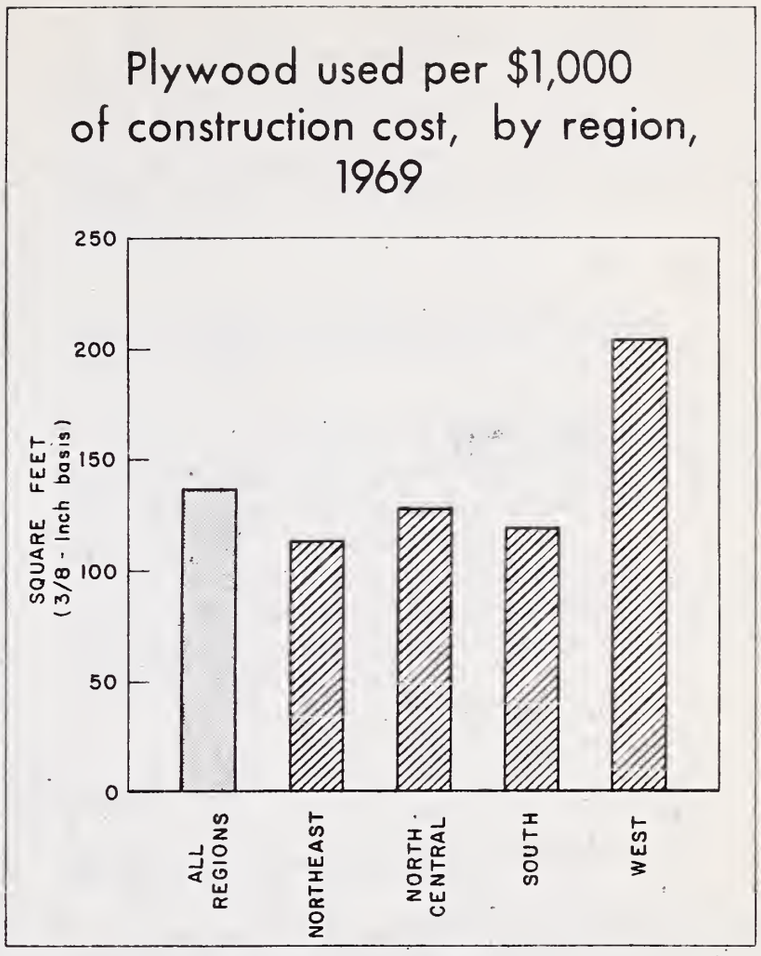

Figure 7

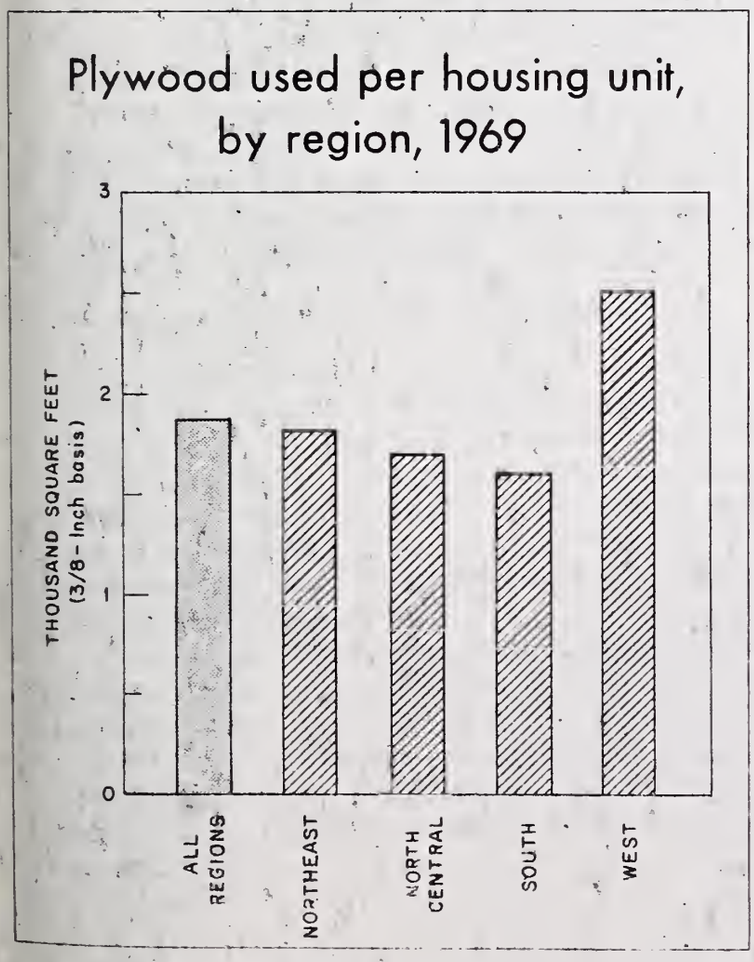

Figure 6

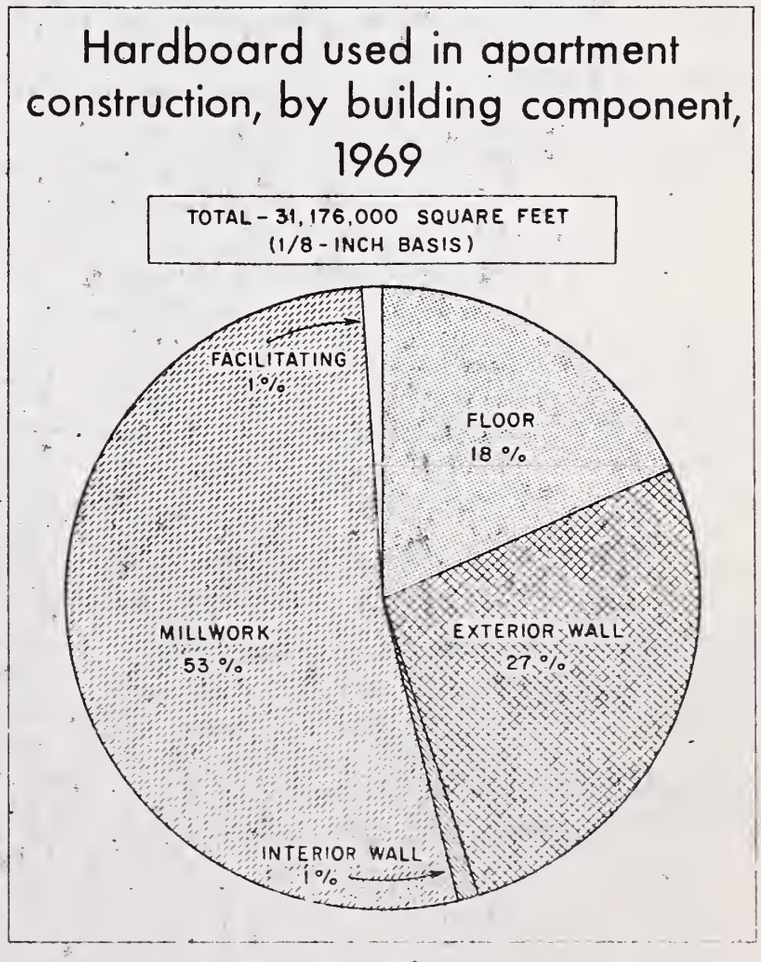

Figure 8

West, averaging 2,504 square feet per unit, and between 1,600 and 1,800 square feet in each of the other three regions.

There was a per unit use of almost 2,300 square feet in the wood structural class compared to a lower average use of 715 square feet in the nonwood structural class. Regional per unit use within the wood structural class showed little variation and ranged from 2,693 square feet in the West to 2,007 square feet in the South.

Use per square foot of floor area about 2 square feet

An average of 2.03 square feet of plywood was used per square foot of apartment floor area, ranging from a high of 2.75 square feet in the West to a low of 1.69 for the South (table 4).

Although there was a large difference in usage between structural classes, within each structural class the regional usage was rather uniform. The average use was 2.54 square feet for the wood structural class and ranged from 2.95 square feet in the West to 2.24 square feet in the South. The nonwood structural class averaged only 0.72 square foot with a high of 0.86 in the Northeast and a low of 0.46 square foot in the North Central.

Use per $1,000 of construction cost averages 137 square feet

Plywood use was 137 square feet per $1,000 of apartment construction cost (table 5, fig. 7). Use ranged from a high of 205 square feet in the West to a low of 112 square feet in the Northeast.

In comparing the two structural classes, plywood use per $1,000 construction cost in the wood structural class was 184 square feet or more than 4 times that in the nonwood structural class.

HARDBOARD

A total of 31.2 million square feet (1/8-inch basis) of hardboard was used in the construction of apartment buildings in the United States during 1969 (table 2). Use by region varied from a high of 14.1 million square feet, or 45 percent of total use, in the South to a low of 3.6 million square feet, or 11 percent, in the West. Hardboard consumed in the Northeast and North Central was 31 and 13 percent, respectively, of total usage.

Eighty percent, or 25 million square feet, of all hardboard was used in the wood structural class, versus 6 million square feet in the nonwood structural class. The highest use, within either structural class, was in the South with 11 million square feet.

More than half of hardboard used in millwork

Fifty-three percent of all hardboard, or 16.6 million square feet, was used in millwork (table 8, fig. 8). Three-fourths or 12.6 million square feet, of the hardboard used for millwork was used in base cabinets. Hardboard usage in the exterior walls was 27 percent, almost all for siding. About 18 percent was used in floor underlayment. Minor amounts were used for facilitating purposes and in interior walls.

Hardboard use in the wood structural class totaled 25 million square feet, or 4 times that in the nonwood structural class. In the wood structural class millwork accounted for 45 percent, exterior walls 33 percent, and floors 22 percent of hardboard use. Use in the nonwood structural class was 87 percent for millwork, mostly for kitchen cabinets.

Per housing unit use shows broad differences

Hardboard use per apartment housing unit averaged 49 square feet and varied from 74 square feet in the Northeast to 25 square feet in both the West and North Central (table 3, fig. 9).

Use per housing unit in the wood structural class was 53 square feet compared to 36 square feet in the nonwood structural class. The highest per unit use was 91 square feet in the Northeast wood structural class; the lowest was 21 square feet in the North Central nonwood structural class.

Minor use of hardboard per square foot of floor area

Only 0.05 square foot of hardboard was used per square foot of floor area in apartment construction (table 4). Regional use varied from a high of 0.08 square foot in the Northeast to a low of 0.03 square foot in both the West and North Central.

Use per $1,000 of construction cost about 3.5 square feet

Hardboard use per $1,000 of apartment construction cost was 3.56 square feet, ranging from a high of 5.1 square feet in the South to a low of 1.8 square feet in the North Central (table 5, fig. 10).

Use in the wood structural class averaged 4.27 square feet or double that in the nonwood structural class.

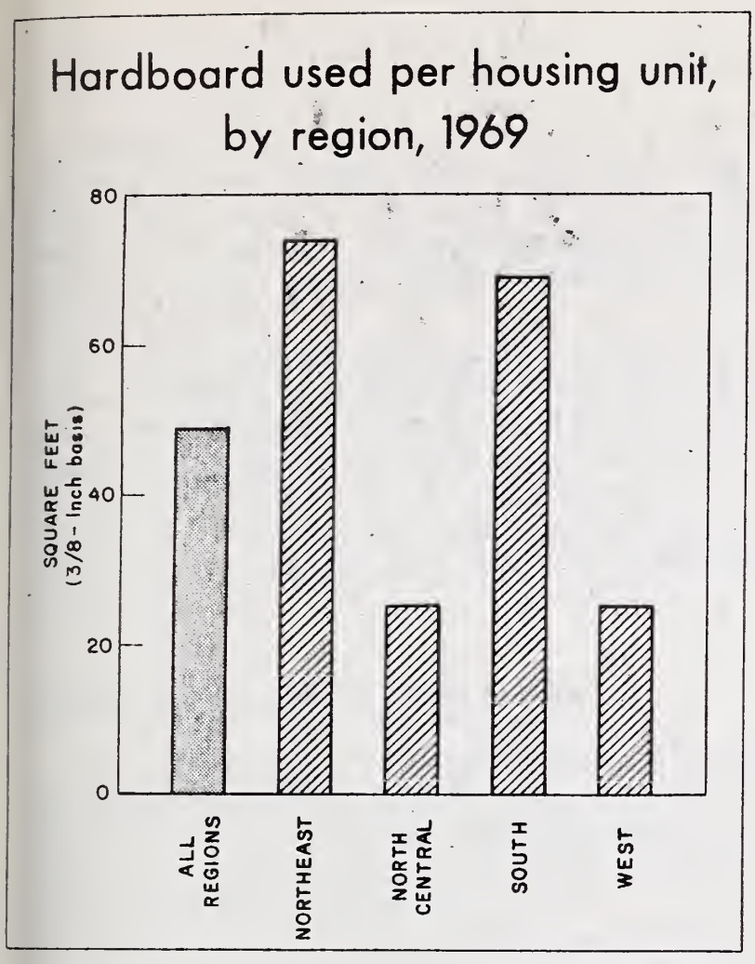

Figure 9

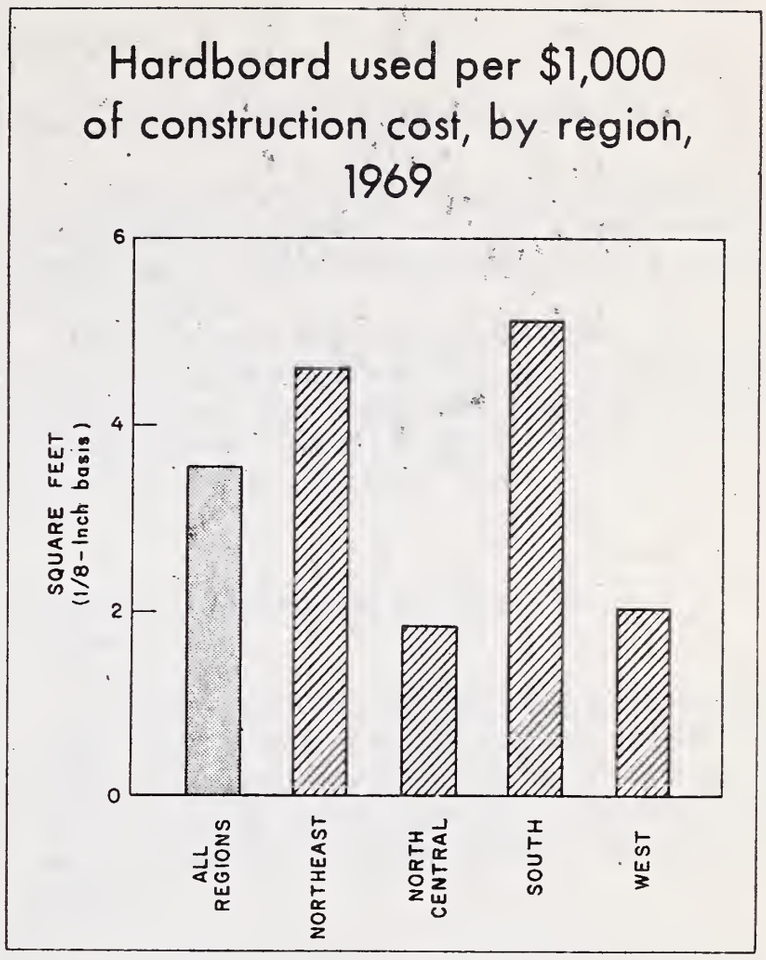

Figure 10

Table 8.–Hardboard used in apartment buildings constructed in the United States, by region and structural class and building component, 1969

(Thousand square feet, 1/8-inch basis)

Structural class and building component	Region				
	Northeast	North Central	South	West	All regions
Wood:					
Floor	4,830	--	1,072	--	5,452
Exterior wall	--	61	8,221	--	8,282
Interior wall	--	--	27	--	27
Millwork	3,324	2,987	1,597	3,373	11,281
Total	7,704	3,048	10,917	3,373	25,042
Nonwood:					
Exterior wall	--	--	177	--	177
Interior wall	--	--	128	73	201
Millwork	1,832	470	2,849	169	5,320
Facilitating	--	436	--	--	436
Total	1,832	906	3,154	242	6,134
All classes:					
Floor	4,380	--	1,072	--	5,452
Exterior wall	--	61	8,398	--	8,459
Interior wall	--	--	155	73	228
Millwork	5,156	3,457	4,446	3,542	16,601
Facilitating	--	436	--	--	436
Total	9,536	3,954	14,071	3,615	31,176

PARTICLEBOARD

Particleboard use in apartment construction was 33.2 million square feet (3/4-inch basis) in the United States during 1969 (table 2). The South had the greatest proportion of total use, or 51 percent, followed by the Northeast with 25 percent, North Central 18 percent, and West 6 percent.

The wood structural class used 23.1 million square feet, or 70 percent of all the particleboard consumed in apartment construction. Within the wood structural class the largest amount, or 11.8 million square feet, was used in the South; the least, or 1.8 million square feet, was used in the West. The nonwood structural class accounted for 10 million square feet of which half was in the South.

Particleboard use confined mostly to millwork

Ninety-five percent, or 31.6 million square feet, of all particleboard was used in millwork (table 9, fig. 11). The largest single use, 25.8 million square feet, was for base cabinets. A similar pattern of use prevailed in both wood and nonwood structural classes.

Use per housing unit averaged 52 square feet

Particleboard use averaged 52 square feet per apartment housing unit (table 3, fig. 12). In the South the average was 83 square feet compared to only 14 square feet in the West.

Use per housing unit averaged 60 square feet in the nonwood structural class and 49 square feet in the wood structural class. Both highest and lowest per unit use were in the wood structural class—87 square feet in the South and 14 square feet in the West.

Minor use of particleboard per square foot of floor area

Only 0.06 square foot of particleboard was used per square foot of floor area in apartment construction (table 4). Regional variation ranged from 0.09 square foot in the South to 0.02 square foot in the West. There was no significant variation between the structural classes.

Table 9.—Particleboard used in apartment buildings constructed in the United States, by region and structural class and building component, 1969

(Thousand square feet, 3/4-inch basis)

Structural class and building component	Region				
	Northeast	North Central	South	West	All regions
Wood:					
Floor	--	--	1,460	--	1,460
Millwork	5,041	4,417	10,382	1,810	21,650
Total	5,041	4,417	11,842	1,810	23,110
Nonwood:					
Interior wall	--	--	68	--	68
Millwork	3,122	1,528	5,046	298	9,994
Total	3,122	1,528	5,114	298	10,062
All classes:					
Floor	--	--	1,460	--	1,460
Interior wall	--	--	68	--	68
Millwork	8,163	5,945	15,428	2,108	31,644
Total	8,163	5,945	16,956	2,108	33,172

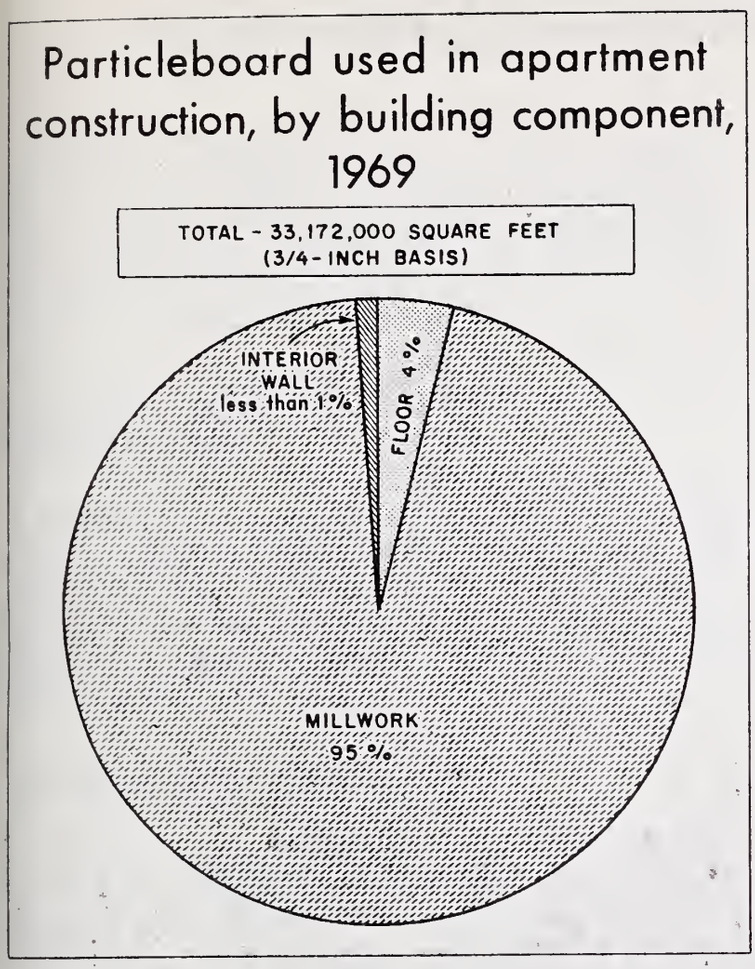

Figure 11

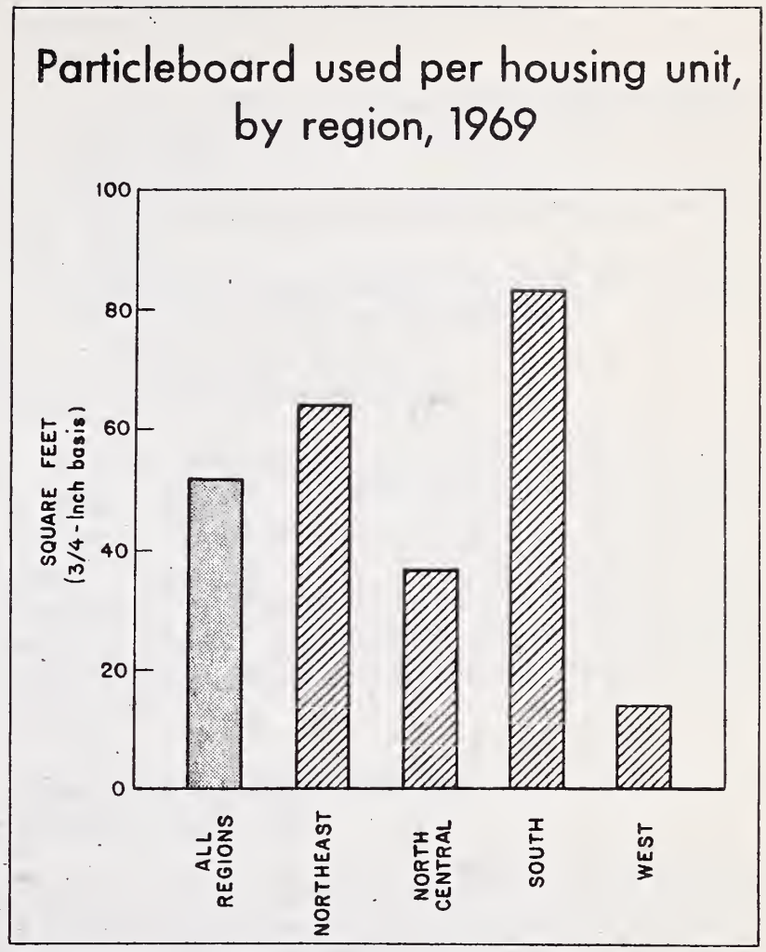

Figure 12

Use per $1,000 of construction cost
3.8 square feet

Particleboard use per $1,000 of apartment construction cost averaged 3.8 square feet, varying from a high of 6.1 square feet in the South to a low of 1.2 square feet in the West (table 5, fig. 13). The variation between structural classes was minor.

INSULATION BOARD

A total of 28.8 million square feet (1/2-inch basis) of insulation board was consumed in apartment building construction in the United States during 1969 (table 2). Average use amounted to 45 square feet per housing unit, 0.05 square foot per square foot of floor area, and 3.29 square feet per $1,000 of construction cost (tables 3, 4, and 5). Sheathing on exterior walls accounted for 92 percent of total use, floor underlayment for 6 percent, and interior walls for 2 percent.

Data by regions or structural classes are not included because of excessive sampling error.

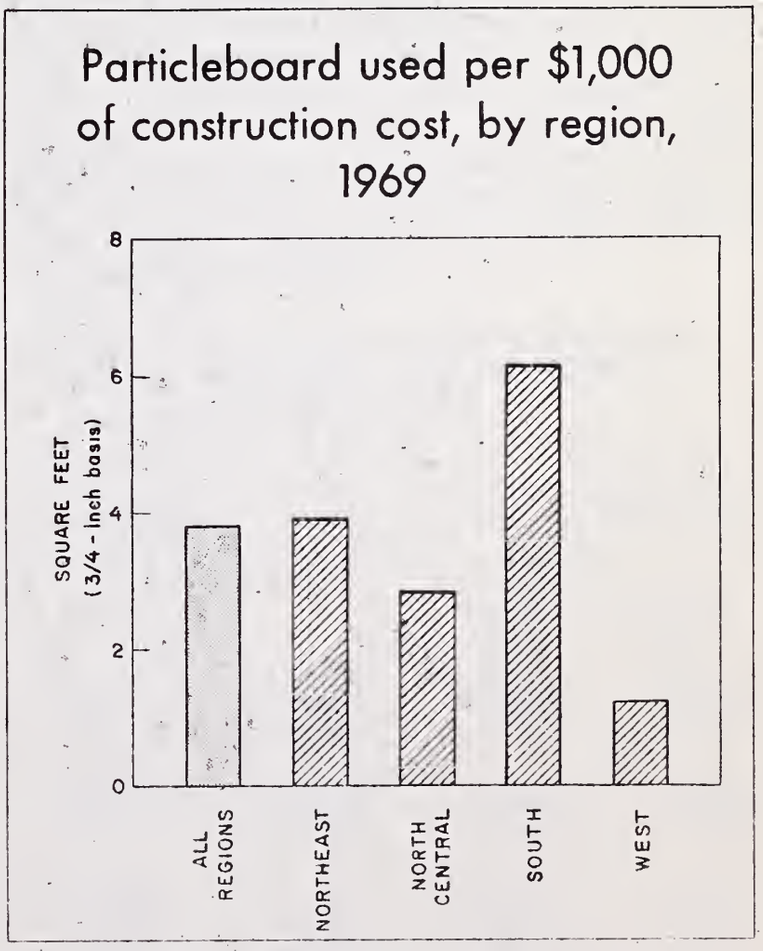

Figure 13

COMPARISON OF APARTMENT SURVEYS, 1962 AND 1969

A survey[4] was made by the Forest Service to obtain 1962 data on multifamily housing for use in analyses of national timber supply and demand. Comparisons are made between the 1962 and 1969 surveys for lumber and plywood only as other wood products data were not gathered on a comparable basis.

Total lumber and plywood use in 1969 increased over 1962

Between 1962 and 1969 total lumber use in apartment construction increased 500 million board feet and total plywood use increased over 400 million square feet (table 10). The major cause for the rise is attributed to a 200,000 increase in the number of apartment housing units in 1969.

Lumber use per housing unit down

Lumber use per housing unit in 1969 was 3,886 board feet compared to 4,500 board feet in 1962, a decrease of 14 percent (table 11). Per unit use was down 9 percent in the wood structural class and 48 percent in the nonwood class. In-place use decreased 10 percent and facilitating lumber use 60 percent. Lumber use per housing unit has also decreased in each of the major building components (i.e. sheathing and framing, finish floor, and millwork) that comprise in-place lumber with the exception of sheathing and framing in the nonwood structural class.

There are a number of probable reasons for this decrease in lumber use per housing unit, including the following:

1. Less facilitating lumber and plywood are used as a result of–
   a. greater use of metal or other nonwood items,
   b. more efficient use of wood forming materials,
   c. changes in building design,
   d. off-site casting of concrete beams, joists, and other items.
2. Most windows in newer apartments are metal.
3. A major part of apartment flooring is either vinyl tile or carpet.
4. Many apartment doors are hung in metal frames with attached metal trim.
5. Over half of the shelving used in apartments is now plywood.
6. Conventional roof framing systems using individual roof rafters and ceiling joists have been replaced by prefabricated roof truss systems.
7. Interior paneling of plywood has largely replaced the limited volume of lumber formally used for paneling.
8. Plywood and other materials have replaced lumber siding.
9. Sheathing in roof, exterior wall, and floor is now largely plywood rather than lumber.

Plywood use per housing unit up

Plywood use per housing unit was 1,879 square feet in 1969 compared to 1,800 square feet in 1962, an increase of 4 percent (table 11). Use per housing unit gained 10 percent in the wood structural class but dropped 21 percent in the nonwood structural class. Although in-place plywood use per unit increased in both structural classes, facilitating uses showed marked decreases.

Plywood increase based mainly on replacement of lumber

Most of the increases in plywood use per housing unit represent replacements for lumber in such areas as shelving, paneling, sheathing, and exterior siding. Probable reasons include lumber in-place costs and ease of application in varied job requirements. Such shifts in wood use are expected to continue. However, contacts made with contractors during the 1969 survey indicated a possible decrease in the use of plywood for forming concrete. This decrease, if it becomes a reality, will be due primarily to replacement of wood by metal and to increasing use of better quality plywood, sometimes with surface treatments, which enables additional re-use of the same material.

Table 10.–Lumber and plywood used in apartment buildings constructed in the United States, by structural class, 1962 and 1969

Structural class and year	Housing units	Lumber	Plywood (3/8-inch basis)
	Number	*Thousand board feet*	*Thousand square feet*
Wood:			
1962	330,150	1,832,000	690,000
1969	471,569	2,370,756	1,082,549
Nonwood:			
1962	110,050	148,000	100,000
1969	168,731	117,540	120,679
All classes:			
1962	440,200	1,980,000	790,000
1969	640,000	2,488,296	1,203,228

[4] Wright, M. G. A study of wood use in the construction of multifamily residential structures. Forest Service unpublished report, 1963.

Table 11.—Use per housing unit of lumber and plywood in apartment buildings constructed in the United States, by structural class, building component or construction item, 1962 and 1969

Wood product by building component or construction item	Structural Class											
	Wood				Nonwood				All Classes			
	1962		1969		1962		1969		1962		1969	
	Board feet	*Per-cent*	*Board feet*	*Per-cent*	*Board feet*	*Per-cent*	*Board feet*	*Per-cent*	*Board feet*	*Per-cent*	*Board feet*	*Per-cent*
Lumber:												
Board and dimension	4,310	78	4,246	85	65	5	128	18	3,249	72	3,161	82
Finish flooring	310	6	58	1	285	21	36	5	304	7	52	1
Millwork	735	13	649	13	400	30	297	43	652	14	557	14
All in-place	5,355	97	4,953	99	750	56	461	66	4,205	93	3,770	97
Facilitating	195	3	74	1	590	44	236	34	295	7	116	3
Total	5,550	100	5,027	100	1,340	100	697	100	4,500	100	3,886	100
	Square feet		*Square feet*		*Square feet*		*Square feet*		*Square feet*		*Square feet*	
Plywood (3/8-inch basis):												
Sheathing	1,450	69	1,564	68	--	--	34	5	1,088	60	1,160	62
Finish flooring	--	--	130	6	--	--	112	16	--	--	126	7
Millwork	485	23	531	23	130	86	336	47	397	22	480	25
All in-place	1,935	92	2,225	97	130	86	482	68	1,485	82	1,766	94
Facilitating	155	8	71	3	780	14	233	32	315	18	113	6
Total	2,090	100	2,296	100	910	100	715	100	1,800	100	1,879	100

DEFINITIONS

Apartment building—a structure containing 3 or more housing units; low-rise apartments are 3 stories or less in height; high-rise apartments are 4 stories or more in height.

Facilitating materials—those materials consumed during the construction stage of the building and used for forming of concrete, shoring, scaffolding, or any other temporary needs associated with building construction.

Housing unit—a room or group of rooms providing complete living facilities for one family, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

In-place materials—the materials remaining in the building after construction is finished as an integral part of the permanent structure.

Nonwood structural class—apartment buildings whose structural framing consists of steel members, concrete, masonry, or any nonwood item or combination of items used in the major structural areas of the walls, floors, and roof. Almost all of the buildings in this structural class are four stories or more in height.

Wood structural class—Apartment buildings in which wood is used in one or more of the following structural areas: (1) wall framing of wood studs or timbers; (2) floor framing of wood joists or beams; and (3) roof framing of wood rafters, trusses, or beams. Almost all buildings in this structural class are three stories or less in height.

GPO 926-934